

Lengthwise	Refractive indices			Sign of elongation	Extinction angles	Twinning plane may show	Inferred habit—elongated on
	Lengthwise	Crosswise	Crosswise				
α 1.490	β 1.555	γ 1.650	..	0°	Lengthwise	axis <i>b</i>	
β 1.555	α 1.490	γ 1.650	±	0–13°	Crosswise or lengthwise	axis <i>a</i>	
γ 1.650	α 1.490	β 1.555	+	0–30°	Diagonally	axis <i>c</i>	
γ 1.650	α 1.490	β 1.555	+	0–6½°	Lengthwise	zone of <i>e</i> : <i>b</i>	

These data are being applied to the study of the crystals of calcium oxalate occurring in official crude drugs and other plants, a report on which will appear elsewhere.

BOTANY.—*Two new species of Acanthospermum from the Galapagos Islands.*¹ S. F. BLAKE, Bureau of Plant Industry.

Several months ago I published² a revision of the genus *Acanthospermum*, a small group of *Asteraceae* closely related to *Melampodium*, from which it is distinguished technically by the presence of spines or hooked prickles on the indurated phyllaries which envelop the ray achenes. Of the eight species there described the most aberrant is *Acanthospermum lecocarpoides* Robins. & Greenm., the sole member of the Section *Lecocaropsis*, which is distinguished from the two other sections of the genus by its pinnatifid leaves, plump trigonous-turbinate fruit bearing spines only around the broadly rounded apex, and comparatively large rays.³ The species, seen by me only in two collections from Hood Island, Galapagos Archipelago, is remarkable for its rather close resemblance in every feature but the fruit to the monotypic genus *Lecocarpus* Decaisne, which is confined to Chatham and Charles Islands of the same group.

After the paper above referred to had been turned in for publication, I found at the Gray Herbarium two sheets of *Acanthospermum*, collected by Alban Stewart on Chatham and Gardner-near-Hood Islands, which appeared to represent two new species of the Section *Lecocaropsis*. Through the kindness of Miss Alice Eastwood, I was able to supplement these two sheets by the extensive series of mounted and unmounted duplicates of the same two numbers in the herbarium of the California Academy of Sciences. Study of this material, amounting in all to 42 sheets, shows that it unquestionably represents two new forms of the Section *Lecocaropsis*. Since these

¹ Received March 5, 1922.

² Contr. U. S. Nat. Herb. 20: 383–392, pl. 23. 1921.

³ The extreme corky-woody thickening of the fruiting phyllaries at maturity is also characteristic of this section of the genus.

forms, although closely related, are not connected by intermediates, they are here treated as species.

Since the days of Darwin's voyage on the *Beagle*, the Galapagos Archipelago has been a classical region for the study of the evolution of closely allied forms of both plants and animals. The three species of *Acanthospermum* here discussed make an interesting addition to the list of plant groups represented on different islands by distinguishable forms so closely related that their origin from a common ancestor, and presumably at no great distance in the past, is incontestable. The abundant material representing two of these forms, moreover, affords a basis for a greater degree of assurance as regards their probable distinctness than has often been the case previously.

As already mentioned, *Acanthospermum* is closely allied to *Melampodium*. *Melampodium* is an American genus of about 43 species ranging from Kansas to Brazil, and represented by one introduced species in the Philippine Islands, but not known from the Galapagos Islands. *Acanthospermum* includes, with the two species here described, ten species, native in the West Indies, South America, and the Galapagos Islands, and introduced in North and Central America and in the Old World. In both genera only the ray flowers are fertile, and each achene is closely enveloped and hidden by the corresponding subtending phyllary. The compound structures, called "fruits" for the sake of brevity, are armed in *Acanthospermum* with several or many spines or hooked prickles. In *Melampodium* the achene-enclosing phyllaries are smooth or merely tuberculate, and are in one section developed at apex into a cup or hood which may be prolonged into a single short or long often recurved horn on the apical outer margin.

The most remarkable character of the three species of *Acanthospermum* here considered is the variability in the armament of the fruits, a feature quite without parallel in the other species of the genus. In this respect *A. leptolobum* is by far the most variable. Although this species happens to be represented by far more material than the others (34 sheets, as opposed to 8 of *A. brachyceratum* and 2 of *A. lecocarpoides*), this cannot be considered the explanation of the variability, since the extremes represented in figure 1, *d-j*, are sometimes found in a single head. Especially noteworthy is the type of fruit represented in figure 1, *j*. Technically this fruit by itself would be referred to *Melampodium*. The absence of spines in this type of fruit seems to be due to a loss of vigor or nourishment, as indicated by the comparatively small size, and not to infertility, for the seed is quite



FIG. 1. Leaves and fruits of *Acanthospermum*.—*a, d-j, A. leptolobum*; *b, k-m, A. brachyceratum*; *c, n-p, A. lecocarpoides*. *a-c*, $\times 1$; *d-p*, \times about 2. All drawn from the types or specimens of the type collections. The ventral side of the fruits faces left in each case.

as well developed in such fruits as in normal ones. One is tempted to explain the variability of these three forms of *Acanthospermum* by the supposition of a very recent origin. The suggestion may also be made that the absence in the Archipelago of native mammals whose fur would provide a means of transport for the spiny fruits may be in some way correlated with the tendency to loss of spines. This tendency toward abortion of spines in the fruits of various unrelated genera of plants of the Galapagos Islands has already been mentioned by Robinson,⁴ and considered explicable by the paucity of indigenous mammals.

The three species of the Section *Lecocaropsis* may be separated by the following key.

Leaves usually divided about half way to midrib, the rachis 4 to 20 mm. wide; body of fruit 4 to 5 mm. deep; horns usually subequal, or the outer longer or rarely obsolete.

Leaf blades 4.5 to 9 cm. long, 2.2 to 4.5 cm. wide; peduncles 2.3 to 4.5 cm. long; horns of fruit 3 to 7 mm. long, usually subequal; Hood Island.

A. leocaroides.

Leaf blades 1.5 to 2.5 cm. long, 1.7 to 2 cm. wide; peduncles about 1 cm. long; horns of fruit 1 to 3 mm. long, the outermost the longest; Gardner-near-Hood Island.

A. brachyceratum.

Leaves divided nearly to the midrib, the rachis only 1 to 2 mm. wide; body of fruit 2.2 to 3.5 mm. deep; inner horns of fruit usually much longer than the outer; Chatham Island.

A. leptolobum.

Acanthospermum brachyceratum Blake, sp. nov. Figure 1, *b, k-m*.

Base not seen; stem indurated, 60 cm. high, dichotomous, densely spreading-hispidulous; leaves opposite, hispidulous and gland-dotted above and chiefly on the nerves beneath; petioles 8 to 12 mm. long, connate at base, narrowly margined; blades oval-ovate, 1.5 to 2.5 cm. long, 1.7 to 2 cm. wide, obtuse, cuneate at base, lobed about to middle, the lobes 5 to 7 pairs, cuneate or oblong, revolute-margined, and toward apex 2 to 5-lobed with short obtuse densely hispidulous lobes; peduncles solitary, terminal, densely sordid-hispidulous, about 1 cm. long; heads 1.5 cm. wide; phyllaries 4, deltoid-ovate, obtuse, entire, hispidulous, 6 mm. long, 5 mm. wide; rays about 8, yellow, oval, tridenticulate, the lamina joined in a ring at base without proper tube, hispidulous and stipitate-glandular dorsally, 5.5 mm. long, 2.8 mm. wide; disk corollas numerous, yellow, the slender tube 1 mm. long, glandular, the campanulate throat 0.8 mm. long, the triangular acute recurved teeth 1 mm. long; pales acuminate, lanceolate, dentate at apex, stipitate-glandular above, about 3 mm. long; fruit turbinate, slightly compressed laterally, densely stipitate-glandular throughout and somewhat hispidulous, the body 4.5 to 5.5 mm. high, 4 to 4.5 mm. deep, bearing around the rounded apex 5 to 7 subulate horns usually grooved on the inner side, the 2 to 4 inner ones shorter, spreading or slightly ascending, 1 to 2 mm. long, the outermost one erect, with broadened base, 2 to 3 mm. high, the one or two lateral ones similar to the shorter inner ones.

Type in the Gray Herbarium, collected on Gardner-near-Hood Island, Galapagos Islands, September 28, 1905, by Alban Stewart (no. 701). Dupli-

⁴ B. L. ROBINSON. *Flora of the Galapagos Islands*. Proc. Amer. Acad. 38: 238. 1902.

cates in the herbarium of the California Academy of Sciences and the U. S. National Herbarium.

Gardner-near-Hood Island, on which this species is found, is a tiny islet only 2 km. or less from Hood Island, the locality of *A. lecocarpoides* Robins. & Greenm. The two forms are very closely related, but *A. brachyceratium* may be distinguished by its much smaller, more finely lobed leaves, its shorter peduncles, and its shorter-spined fruit. It is described by the collector⁵ as a common bush two feet high.

Acanthospermum leptolobum Blake, sp. nov.

Figure 1, a, d-j.

Annual, dichotomous, about 1 m. high, the stem and branches slender, woody, grayish, densely tuberculate-hispidulous; leaves opposite, rather densely hispidulous on both sides; petioles about 8 mm. long, connate at base, narrowly margined, about 1 mm. wide; blades ovate, 2.5 to 4 cm. long, 1.3 to 4 cm. wide, pinnatifid nearly to midrib, the leaf rachis 1 to 2 mm. wide, the lobes about 5 pairs, mostly opposite, irregularly 2 to 8-lobed with linear obtuse segments or the uppermost entire, the segments again sometimes toothed; peduncles terminal, solitary, densely spreading-hispidulous with subglandular hairs, 1.3 to 2.5 cm. long; heads about 3 cm. wide; phyllaries 4, ovate, obtuse or acute, usually serrulate, hispidulous chiefly beneath, 8 to 10 mm. long, 4.5 to 6 mm. wide; rays 10, yellow, oval, tridenticulate, merely closed in a ring at base without proper tube, about 9-nerved, stipitate-glandular dorsally, 10 mm. long, 4.5 mm. wide; disk corollas numerous, yellow, the slender tube sparsely glandular, 1.5 mm. long, the campanulate throat 1 mm. long, the five recurved triangular teeth 1 mm. long; stamens cordate-sagittate at base; pales acuminate, lacerate-dentate above, stipitate-glandular, about 3 mm. long; fruit compressed-turbinate, densely stipitate-glandular and more or less hispidulous, whitish at maturity, the body 2.8 to 3.5 mm. high, 2.2 to 3.5 mm. deep at apex, bearing at apex 1 to 5 horns, the 1 to 3 inner subulate or lance-subulate, 1 to 4 mm. long, divergent-spreading, when large excavated at the base, or sometimes wanting, the 1 to 3 outer triangular to subulate, erect or curved-ascending, 1 to 4 mm. high, at least the central one excavated at base, the latter sometimes represented only by its deeply excavated base and without free portion, or all the horns entirely wanting.

Type in the Gray Herbarium, collected in woodland at Sappho Cove, Chatham Island, Galapagos Islands, altitude 240 meters, February 10, 1906, by Alban Stewart (no. 700). Duplicates in the herbarium of the California Academy of Sciences and the U. S. National Herbarium.

Chatham Island, on which this species occurs, is about 50 km. from Hood Island. Its representative of *Acanthospermum*, *A. leptolobum*, is so different from that of Hood Island that its specific distinctness is likely to be confirmed by future collecting, while the form found on Gardner-near-Hood Island, *A. brachyceratium*, is so much closer to *A. lecocarpoides* that it may prove to be only a variety. Stewart⁶ describes his no. 700 as a common bush, 3 to 4 ft. high, in woodland at 800 ft., and says: "Except for the presence of spines on the achenes [fruits] the specimens from this island are more like *Lecocarpus*

⁵ A. STEWART. *Botanical survey of the Galapagos Islands*. Proc. Calif. Acad. IV. 1: 148. 1911.

⁶ Loc. cit.

foliosus than an *Acanthospermum*." I have not been able to verify his statement that some of the material from Gardner-near-Hood Island (*A. brachyceratum*) has "some of the leaves deeply cut, as do the specimens from Chat-ham Island."

In this species the slender stem is so woody that I was inclined to consider it frutescent, until a specimen was found among the unmounted material collected by Stewart which showed clearly that the plant was an annual.

In conclusion, it may be well to mention that the data for the specimens collected by Mr. Stewart on the 1905-06 Galapagos Expedition of the California Academy are in an unfortunate state of confusion. The 33 unmounted sheets of *A. leptolobum*, for example, are not accompanied by data, but they are so clearly identical in every feature with his no. 700 as represented in the Gray Herbarium and the herbarium of the California Academy of Sciences that I have no hesitation in considering them a portion of the same collection.

BOTANY.—*A perennial species of teosinte*.¹ A. S. HITCHCOCK,
Bureau of Plant Industry.

In a recent article² entitled *Teosinte in Mexico*, Mr. G. N. Collins reviews our knowledge concerning teosinte in Mexico. Up to the present all the forms of teosinte have been referred to one species, *Euchlaena mexicana* Schrad. There are two forms of this, both annual, one from Durango, where it was collected by Dr. Edward Palmer, and one grown in Florida, the origin of which is uncertain. The latter form has been grown in France and may have come originally from Guatemala. At present the only known localities for the annual teosinte in the wild state are Durango and the State of Mexico near Chalco, where it was recently collected by Collins. The origin of the specimens described by European botanists is unknown.

The botanical history of the annual species is as follows:

Euchlaena mexicana Schrad. Ind. Sem. Hort. Goettingen. 1832; reprinted in *Linnaea* 8: Litt. 25. 1833. I have not seen the original publication, an ephemeral seed list, but fortunately the reprint is accessible. Schrader describes the genus and species together, "*Euchlaena mexicana* Schrad. Nov. Gen. e Graminearum Olyrearum tribu," and so on. He describes the staminate spikelets as 1-flowered instead of 2-flowered and the genus is placed with the *Olyra* group. As to locality he says, "Mexico, Dr. Mühlenfordt." Nothing further concerning the history of this is known.

Reana giovanninii Brign. Ind. Sem. Hort. Mutin. 1849. The publication cited is also an ephemeral seed list which I saw at the Botanical Garden of

¹ Received March 20, 1922.

² *Journ. Hered.* 12: 339. 1922.